

TIM ANDREAS OSSWALD, Ph.D.
IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

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BAY MATERIALS, LLC,)
Plaintiff,)Case No.
vs.)21-1610-RGA
3M COMPANY,)
Defendant.)
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DEPOSITION OF TIM ANDREAS OSSWALD, Ph.D.
Reston, Virginia
February 18, 2022

REPORTED BY: Tina Alfaro, RPR, CRR, RMR
Job no. 206467

Page 2 1 TIM ANDREAS OSSWALD, Ph.D. 2 Videotaped deposition of TIM ANDREAS 3 OSSWALD, Ph.D., held at the offices of: 4 5 Cooley, LLP 6 11951 Freedom Drive 7 Reston, Virginia 20190 8 9 Taken pursuant to notice before Tina M. 10 Alfaro, a Notary Public within and for the State of 11 Virginia. 12 13 14 15 16 17 18 19 20 21 22 23 24 25	Page 3 1 TIM ANDREAS OSSWALD, Ph.D. 2 APPEARANCES: 3 ON BEHALF OF THE PLAINTIFF: 4 Finnegan, Henderson, Farabow, Garrett & Dunner, LLP 5 BY: ANDREW RENISON, ESQ. 6 PAUL TOWNSEND, ESQ. 7 CHARLES COLLINS-CHASE, ESQ. (remotely) 8 901 New York Avenue NW 9 Washington, D.C. 20001 10 11 ON BEHALF OF THE DEFENDANT: 12 Cooley LLP 13 BY: ADAM PIVOVAR, ESQ. 14 1299 Pennsylvania Avenue, NW 15 Washington, D.C. 20004 16 17 ALSO PRESENT: Alan Jeffrey Giacomini 18 Sandra Nowak (3M) 19 20 21 22 23 24 25
Page 4 1 TIM ANDREAS OSSWALD, Ph.D. 2 I N D E X 3 EXAMINATION 4 WITNESS PAGE 5 TIM ANDREAS OSSWALD, Ph.D. 6 By Mr. Pivovar 6 7 EXHIBITS 8 OSSWALD EXHIBITS PAGE 9 Exhibit 1 11 10 Redacted version of declaration 11 Exhibit 2 11 12 Exhibits to declaration 13 Exhibit 5 7 14 630 Patent 15 Exhibit 6 51 16 Columns 21 and 22 of '630 Patent 17 Exhibit 7 65 18 Excerpt of Table 8 from '630 Patent 19 Exhibit 8 126 20 Figure 1A and Figure 1B of '630 Patent 21 Exhibit 9 132 22 Figure 1B of '630 Patent 23 Exhibit 10 167 24 Depiction of images from paragraph 100 25 of declaration Exhibit 11 172 excerpts from paragraph 125 and 126 of declaration NOTE: Exhibits 3 and 4 not marked for use in deposition.	Page 5 1 TIM ANDREAS OSSWALD, Ph.D. 2 THE VIDEOGRAPHER: This is the start of 3 media labeled No. 1 in the video recorded deposition 4 of Tim Osswald in the matter of Bay Materials, LLC 5 versus 3M Company in the United States District 6 Court for the District of Delaware, Case 7 No. 21-1610-RGA. This deposition is being held at 8 11951 Freedom Drive, 14th Floor, Reston, Virginia on 9 Friday, February 18th, 2022 at approximately 10 9:22 a.m. 11 My name is Nathan Cane. I'm the legal 12 video specialist from TSG Reporting, Inc. 13 headquartered at 228 East 45th Street, Suite 810, 14 New York City, 10017. The court reporter is Tina 15 Alfaro in association with TSG Reporting. 16 Counsel, please introduce yourselves. 17 MR. PIVOVAR: Adam Pivovar of Cooley, LLP 18 on behalf of 3M. I'm here today with Dr. Alan 19 Jeffrey Giacomini, and in-house counsel for 3M Sandra 20 Nowak is on the line. 21 MR. RENISON: Andrew Renison of Finnegan 22 law firm on behalf of Plaintiff Bay Materials. With 23 me in person is my colleague Paul Townsend, and on 24 the call on the line Charles Collins-Chase, also 25 Finnegan.

Page 6 1 TIM ANDREAS OSSWALD, Ph.D. 2 THE VIDEOGRAPHER: Will the reporter please 3 swear in the witness. 4 (Witness sworn.) 5 WHEREUPON: 6 TIM ANDREAS OSSWALD, Ph.D., 7 called as a witness herein, having been first duly 8 sworn, was examined and testified as follows: 9 EXAMINATION 10 BY MR. PIVOVAR: 11 Q. Good morning. 12 A. Good morning. 13 Q. Can you please state your name for the 14 record. 15 A. Tim Andreas Osswald. 16 Q. Thank you. Have you been deposed before? 17 A. Yes. 18 Q. How many times? 19 A. I don't know. Over 50 times. 20 Q. Okay. So you know the drill? 21 A. Yes. 22 Q. Okay. Do you have any questions about the 23 process? 24 A. No. 25 Q. Okay.	Page 7 1 TIM ANDREAS OSSWALD, Ph.D. 2 Now, you prepared for today's deposition, 3 right? 4 A. Yes. 5 Q. Did you review your declaration? 6 A. Correct. 7 Q. All right. And you understand that there 8 are two patents that you're alleging are being 9 infringed by 3M's Clarity Aligners Flex product? 10 A. Correct. 11 MR. PIVOVAR: Can you please mark this as 12 Exhibit 5. 13 (Osswald Exhibit 5 was marked 14 for identification.) 15 BY MR. PIVOVAR: 16 Q. Dr. Osswald, the court reporter has just 17 handed you what's been marked as Exhibit 5. It's 18 labeled U.S. Patent No. 10,946,630; do you see 19 that? 20 A. Yes. 21 Q. Now, this is one of the two patents that 22 you're accusing 3M's Clarity Aligners Flex of 23 infringing, correct? 24 A. Correct. 25 Q. If I refer to this as the '630 Patent,
Page 8 1 TIM ANDREAS OSSWALD, Ph.D. 2 you'll be able to follow along with that as the kind 3 of standard patent abbreviations that we use? 4 A. Yes. 5 Q. Okay. All right. I'd like you to please 6 turn to page -- well, what is column 21 and 22 on 7 the back page of the last -- well, not all the way 8 in the back. It's column 21 of Exhibit 5, the 9 '630 Patent; do you see that? 10 A. Yes. 11 Q. You see there is a table 8 in the middle of 12 that page? 13 A. Yes. 14 Q. Okay. Excuse me. Do you see on the 15 left-hand side of that table it says "Layers"? Do 16 you see that? 17 A. Yes. 18 Q. And it says the order of the layers as 19 they're listed is A, A prime, B, B prime, C prime, 20 C, correct? 21 A. Correct. 22 Q. Okay. Now, if you look over on sample 8, 23 do you see that on the right-hand side? 24 A. Yes. 25 Q. Okay. Now, do you see how it shows	Page 9 1 TIM ANDREAS OSSWALD, Ph.D. 2 thickness for sample 8? 3 A. Yes. 4 Q. And it says 0.125 millimeters, 0.125 5 millimeters, 0.25 millimeters, 0.125 millimeters, 6 and 0.125 millimeters; do you see that? 7 A. Yes. 8 Q. That's referring to five layers, right? 9 MR. RENISON: Objection to the extent it 10 mischaracterizes the document, calls for a legal 11 conclusion. 12 A. Yeah. I mean, I looked at the claims in 13 this patent, the '630 Patent, and the claim 14 obviously covers three layers. There's, of course, 15 an example in column 5 that covers five layers. 16 Q. All right. And you understand sample 8, 17 right? There is a five-layer sheet, right? 18 MR. RENISON: Objection to the extent it 19 mischaracterizes the document. 20 A. Well, I mean, I was -- in my report in my 21 analysis I did an analysis on 3M's product and I 22 restricted myself to doing that analysis. I looked 23 at the published information for Bay Materials also 24 in my analysis, and I did not do an in-depth 25 analysis on that particular example.

Page 10 1 TIM ANDREAS OSSWALD, Ph.D. 2 So I did not -- and I'm -- I can tell you 3 about the 3M product, I can tell you about what I 4 wrote in my report, but I don't want to -- as I 5 wrote in my report, which, in fact, I wouldn't mind 6 having a copy of my report in front of me. 7 Q. Okay. That's completely nonresponsive to 8 my question, but that's okay. Do you see there's a 9 sample 8 in table 8, right, in the '630 Patent? Do 10 you see that? 11 A. Correct. 12 Q. Okay. Can you interpret what that means as 13 an expert in the field? 14 MR. RENISON: Objection to the extent it 15 calls for a legal conclusion. 16 A. Yeah. I mean, I'm not -- I did not do an 17 analysis on the meaning of words in the claim. In 18 my report I say I'm not an attorney. So I did an 19 analysis, I looked at 3M's product, which has five 20 layers, and compared it to the claims of both the 21 '630 Patent and the '263 Patent and that's how I 22 based my opinion of infringement. 23 So I'm not -- I don't think I will today 24 start doing an analysis and a legal conclusion on an 25 example in this patent.	Page 11 1 TIM ANDREAS OSSWALD, Ph.D. 2 (Osswald Exhibits 1 and 2 were 3 marked for identification.) 4 BY MR. PIVOVAR: 5 Q. This is Exhibit 1 in the front and 6 Exhibit 2 in the back and I bound it to make it 7 easier to flip through. 8 Dr. Osswald, the court reporter has just 9 handed you a binder that has been marked with two 10 tabs, and tab 1 is Exhibit 1 and then tab 2 is 11 Exhibit 2. Do you see in tab 1 that's a copy of a 12 redacted version of your expert declaration in 13 support of Plaintiff's motion for a preliminary 14 injunction? Do you see that? 15 A. I see that. 16 Q. Okay. Have you seen a redacted version of 17 your declaration before today? 18 A. No. 19 Q. Okay. So do you understand what redactions 20 are and that this is actually the publicly filed 21 version of your report with confidential information 22 that's been blacked out? 23 A. Correct. 24 Q. Now, do you see in Exhibit 2 -- actually, 25 let's stick with Exhibit 1. So if you go all the
Page 12 1 TIM ANDREAS OSSWALD, Ph.D. 2 way to the end on page 64; do you see that? 3 A. Yes. 4 Q. That's your name, Dr. Tim A. Osswald, 5 right? 6 A. Correct. 7 Q. And you signed that? 8 A. Yes. 9 Q. Okay. 10 Now, in Exhibit 2 you've attached -- let me 11 just dial that back a little bit. To your 12 declaration you attached a number of exhibits that 13 you're relying on, right? 14 A. Yes. 15 Q. Okay. So Exhibit 2 I will tell you is just 16 a tabbed-out binder with the exhibits according to 17 how they were labeled as attachments to your 18 declaration. Okay? So you have a binder that has 19 your redacted declaration and your redacted 20 exhibits. All right? Do you understand that? 21 A. Yes. 22 Q. Okay. Can you please turn to paragraph 15 23 of your report and let me know when you're there. 24 A. I'm there. 25 Q. Go ahead and read it and let me know when	Page 13 1 TIM ANDREAS OSSWALD, Ph.D. 2 you're done and see if it refreshes your memory. 3 (Witness reviewing document.) 4 A. Yes. 5 Q. Do you see that? Okay. There's a 6 statement in the middle of that paragraph where you 7 say "I have applied the claims in accordance with my 8 belief of how a person of ordinary skill in the art 9 at the time of the invention reading the patent and 10 the prosecution history would have understood the 11 claims"; do you see that? 12 A. I see that. 13 Q. Okay. 14 Now, table 8 that we were talking about in 15 Exhibit 5, right, in the '630 Patent, right? 16 A. Yes. 17 Q. Table 8 is in the '630 Patent, you agree 18 with that, right? 19 A. Correct. 20 Q. And you're saying a person of ordinary 21 skill in the art would interpret the claims by 22 reading the patent and the prosecution history, 23 right? 24 MR. RENISON: Objection to the extent it 25 calls for a legal conclusion.

Page 14 1 TIM ANDREAS OSSWALD, Ph.D. 2 A. Well, I mean, I read the patent, I read the 3 prosecution history, and based on the three claims 4 that are being discussed in my report on the -- in 5 the '630 Patent, I compared the words in the claims 6 to the 3M product and I did my analysis based on 7 that. 8 Q. So you read the patent, the '630 Patent, 9 before you rendered your opinion? 10 A. Correct. 11 Q. Right? And you read table 8, right? 12 A. Among other things, I read table 8, but I 13 did not do an analysis on table 8 and the claims. 14 My analysis was restricted to the 3M product and to 15 the Bay Materials example from the Web. 16 Q. Have you ever issued any opinions on claim 17 construction in your over 50 cases that you've 18 worked on as an expert? 19 MR. RENISON: Objection, outside the scope 20 of the report. 21 A. I mean, I've worked with different -- on 22 different cases and some of them dealt with claim 23 construction where I was consulted as an expert in 24 the field on meaning of words, but I have not done 25 that in this case.	Page 15 1 TIM ANDREAS OSSWALD, Ph.D. 2 Q. Have you -- well, let me ask you 3 differently. Have you ever issued an expert opinion 4 on claim construction? 5 MR. RENISON: Same objection, calls for 6 speculation. 7 A. I don't remember. I mean, I'm not an 8 attorney. I know I have worked with attorneys in 9 claim construction cases. I don't remember the -- 10 Q. Let me ask you -- 11 A. -- the title of the -- 12 THE REPORTER: Guys. 13 Q. Sorry. 14 A. I don't remember the title of the -- of the 15 report, but I'm certainly not an attorney. 16 Q. I think there might be a misunderstanding 17 on my part I want to clear up. You said you've been 18 deposed a lot of times, right, in a lot of cases? 19 How many of those cases were actually patent 20 infringement cases? 21 MR. RENISON: Objection to the extent -- 22 A. I don't know. 23 MR. RENISON: -- it mischaracterizes prior 24 testimony. 25 THE WITNESS: I'm sorry.
Page 16 1 TIM ANDREAS OSSWALD, Ph.D. 2 Dr. Osswald, just let me have a chance to 3 make an objection for the record. 4 THE WITNESS: I don't know. 5 BY MR. PIVOVAR: 6 Q. Can you estimate how many? 7 MR. RENISON: Objection, calls for 8 speculation. 9 MR. PIVOVAR: Is it one? Two? Dozens? 10 MR. RENISON: Same objections. 11 A. It's the majority. 12 Q. The majority of those. Okay. 13 Do you see in paragraph 15 of Exhibit 5, 14 which is your declaration, there's also a sentence 15 there that says "The first step in an infringement 16 analysis involves determining the meaning and scope 17 of the claims of the patent"? Do you see that? 18 A. Yes. 19 Q. Okay. You're rendering an opinion on 20 infringement, right? 21 MR. RENISON: Objection to the extent it 22 calls for a legal conclusion. 23 A. Here obviously there has been no claim 24 construction done that I know of. So what I did is 25 as a person of ordinary skill in the art I looked at	Page 17 1 TIM ANDREAS OSSWALD, Ph.D. 2 the different -- at the six different claims in the 3 two patents, looked at the words, compared them to 4 the 3M product to see if the 3M product fulfilled 5 all the words that were in the claim. 6 Q. Okay. And do you feel like you actually 7 understand what the words are used in the claims 8 that you're giving an opinion of infringement on? 9 MR. RENISON: Objection to the extent it 10 calls for a legal conclusion. 11 A. I read the words as I and a person of 12 ordinary skill in the art would have understood it 13 at the time of the invention, and, of course, I also 14 read the patent to see if any of the terms were 15 defined within the patent. 16 Q. Okay. So claim 1 -- and you can grab the 17 '630 Patent, if you would. That's Exhibit 5. Do 18 you see claim 1 there on the same page that we're 19 talking about with table 8? Do you see that? 20 A. Yes. 21 Q. It says "At least two outer layers A and C 22 and an elastomeric inner layer B"; do you see that? 23 A. I see that. 24 Q. Okay. So it's referring to a layer A, a 25 layer C, and a layer B, right?

Page 98 1 TIM ANDREAS OSSWALD, Ph.D. 2 I've done it for the Bay Materials example. 3 Q. Okay. So just so I understand this, you 4 understand what a combined thickness of A, B, and C 5 layers mean; is that right? You understand what it 6 means? 7 MR. RENISON: Same objection. 8 A. Well, in my report I added up -- I added up 9 numbers, I added up the thicknesses that we measured 10 on a product, and an analysis was done on that. I 11 didn't do that on any of the examples of this -- of 12 this -- of these patents. I haven't done it before. 13 So I don't want to -- 14 Q. Do you -- 15 A. -- do an analysis here that I'm not 16 prepared to do it. 17 Q. So do you understand what the combined 18 thickness of the A, B, and C layers means? 19 MR. RENISON: Same objection. 20 A. I see the words there, and the way I 21 interpret it is the way somebody skilled in the art 22 would interpret it for the 3M product where you add 23 up -- where you add up the layers, with the Bay 24 Materials product where you add up the layers, and I 25 did an analysis on that. That's something -- that's	Page 99 1 TIM ANDREAS OSSWALD, Ph.D. 2 work I did to prepare my declaration, which is, I 3 believe, what I'm being deposed on today. 4 Q. So if you look in claim 2 of the 5 '630 Patent, it says "The A, B, and C layers of the 6 polymeric sheet composition have a combined 7 thickness," right? Do you see that language? 8 A. I see that. 9 Q. Right? Do you understand what that means? 10 MR. RENISON: Objection, calls for a legal 11 conclusion. 12 A. I understand the words and that's -- and 13 you can see in my report how I -- how I have used 14 it. So if it's something in my report, then point 15 it to me if I have a mistake in my report that 16 misinterprets the word "combined thickness." 17 Q. I'm just asking you if you understand what 18 the phrase "The A, B, and C layers of the polymeric 19 sheet composition have a combined thickness" means? 20 Do you understand what that means? 21 MR. RENISON: Same objection. 22 A. I understand how -- what the words mean and 23 how a person of ordinary skill in the art would 24 interpret those words. 25 Q. Great. Great. So I want you to tell me
Page 100 1 TIM ANDREAS OSSWALD, Ph.D. 2 what the combined thickness is of the A, B, and C 3 layers of the polymeric sheet composition of sample 4 number 8, table 8 of the '630 Patent. 5 MR. RENISON: Objection, calls for -- 6 MR. PIVOVAR: Can you do that? 7 MR. RENISON: Objection, calls for a legal 8 conclusion, beyond the scope. 9 A. Again, example 8 is -- is more complicated 10 than that and I would have to then dissect it, take 11 it apart, and that's something I did not do to 12 prepare for my -- 13 Q. Okay. 14 A. -- to prepare for my -- my -- 15 Q. I understand -- 16 A. -- declaration. 17 Q. I understand you didn't do it in your 18 declaration. Okay? My question was different. Can 19 you tell me what the combined thickness is of the A, 20 B, and C layers of the polymeric sheet composition 21 of sample 8, table 8 of the '630 Patent? Can you? 22 MR. RENISON: Objection, beyond the scope, 23 calls for a legal conclusion, asked and answered. 24 A. I mean, my answer is still the same, right? 25 I mean, it's table 8, example 8 is part of the	Page 101 1 TIM ANDREAS OSSWALD, Ph.D. 2 patent. It's an example they give there. I did not 3 do an in-depth analysis of the meaning of A, 4 A prime, et cetera. I did not dissect it. 5 I think by doing an analysis like that and 6 by doing a dissection of the -- of the claims and 7 the actual example 8 would be -- would be new 8 information. I mean, that's something I didn't do 9 before this deposition today and I'm happy to do 10 that after this deposition, but I think the work 11 that I did is all in this -- these 64 pages that are 12 here. That's what I'm -- that's the work I did. 13 Q. So a dissection of example 8 would be new 14 information from your perspective; is that right? 15 A. Well, a full dissection -- an analysis of 16 example 8 would be new, sure, because I haven't done 17 it. I read the patent, I understand what it says 18 there, but I don't -- 19 Q. Thank you. 20 A. -- I didn't do an in-depth analysis on it. 21 Q. All right. So I'm asking you can you 22 sitting here today tell me what the combined 23 thickness is of the A, B, and C layers of the 24 polymeric sheet composition of sample 8 in table 8 25 of the '630 Patent?

Page 102 1 TIM ANDREAS OSSWALD, Ph.D. 2 MR. RENISON: Same objections. 3 MR. PIVOVAR: Can you do it? 4 MR. RENISON: Same objections, asked and 5 answered. 6 MR. PIVOVAR: Can you? 7 MR. RENISON: Same objections. 8 A. My answer is still the same. 9 Q. Well, can you do it? Can you? I just want 10 to know if you can. Like yes or no, I can't do it 11 sitting here right now or yes, I could do, one of 12 those two. 13 MR. RENISON: Same objections. 14 A. Like I said, I can sit down and do it after 15 this deposition if I'm asked to do it and do an 16 analysis on it and then you can depose me on that 17 information again, but it's not work I did to -- in 18 this infringement report. 19 Q. I'm sorry. I really apologize. Can you 20 tell me the combined thickness of the A, B, C layers 21 of the polymeric sheet composition in sample 8 of 22 table 8 of the '630 Patent right now? 23 MR. RENISON: Same objections. 24 MR. PIVOVAR: Can you do it? 25 MR. RENISON: Same objections, asked and	Page 103 1 TIM ANDREAS OSSWALD, Ph.D. 2 answered. 3 MR. PIVOVAR: Can you, are you capable of? 4 Do you understand what "capable of" means? 5 MR. RENISON: Objection, argumentative. 6 MR. PIVOVAR: I mean, come on. 7 MR. RENISON: Counsel, please. Treat the 8 witness with respect. 9 MR. PIVOVAR: He can say no. I mean, he's 10 not really treating his oath with respect. 11 MR. RENISON: Counsel -- 12 THE WITNESS: Should we take a little 13 break? I think he needs to calm down. I need a 14 drink of water 15 MR. RENISON: Let's go off the -- let's go 16 off the record, take a break, and hopefully we can 17 resume with a little more decorum. 18 BY MR. PIVOVAR: 19 Q. I have a pending question, actually? 20 A. Okay. Go for it. 21 Q. If you could answer that, it would be 22 great. 23 MR. PIVOVAR: Can you read it back. 24 A. My answer is the same. I -- today as we 25 sit here in a deposition I'm not happy -- I'm not
Page 104 1 TIM ANDREAS OSSWALD, Ph.D. 2 prepared to actually dissect an example some -- of 3 work that I didn't do to prepare for this 4 declaration. And so it's new information. I would 5 have to sit down, I would have to do the analysis, 6 but I don't want to go bit by bit by bit by bit in 7 an analysis where I'm not an attorney, I don't 8 know -- I'm not a judge to do claim construction. 9 So I read the words. I did all of that for 10 the 3M product, I did it for other things. I didn't 11 do it for this. And so it's something new. This is 12 something that I don't want to bring in. It's not 13 in my -- it's not in my report. I'm not prepared to 14 do that. I see words there, but I would need more 15 information than -- than what is there. 16 Q. All right. So let me just make sure I 17 understand this. Sitting here today, right now, you 18 cannot tell me what the combined thickness is of the 19 A, B, and C layers of the polymeric sheet 20 composition of sample 8 in table 8? 21 MR. RENISON: And I'm going to object to 22 the form -- 23 MR. PIVOVAR: Is that correct? 24 MR. RENISON: and Counsel, I think you just 25 impugned the witness's honesty on the record. You	Page 105 1 TIM ANDREAS OSSWALD, Ph.D. 2 have an obligation to conduct yourself with decorum 3 in -- in moving forward in this deposition, and if 4 you don't we're going to have to stop this. 5 MR. PIVOVAR: Sorry. Can you read that 6 last question back. 7 (Record read as requested.) 8 MR. RENISON: Same objections. 9 A. And my answer is the same. I mean, 10 there is -- there is information there. I -- you 11 can take it for -- for what it is. I have no reason 12 to believe it's not true, but I didn't do the 13 analysis on that. It's some -- you want me to do an 14 analysis on something that I didn't do. I'm happy 15 to answer all those questions with the product from 16 3M and with the Bay Materials product from the Web, 17 but this is an analysis I didn't -- I didn't do 18 today. I'm not prepared to do an analysis on this. 19 Q. So you cannot tell me what the combined 20 thickness is of the A, B, and C layers of sample 8, 21 table 8 in the '630 Patent right now? 22 MR. RENISON: Objection to form, outside 23 the scope. 24 MR. PIVOVAR: Is that right? 25 A. I can tell you what the combined thickness

Page 114 1 TIM ANDREAS OSSWALD, Ph.D. 2 BY MR. PIVOVAR: 3 Q. Can you please go to Exhibit 1, which is 4 your redacted declaration, and turn to paragraph 68 5 and let me know when you're there. 6 A. I am there. 7 Q. Okay. So you see that first sentence says 8 "To determine infringement of the '630 and 9 '263 Patents by the Flex Aligner I oversaw testing 10 to identify the polymers present in each layer of 11 the appliance"; do you see that? 12 A. Yes. 13 Q. What are you referring to as "the 14 appliance"? 15 A. The 3M Flex Aligner. 16 Q. Right. It's actually the dental tray, 17 right? 18 A. Correct. 19 Q. Okay. Not the flat polymer sheet? 20 A. No. I did not receive a flat sheet. 21 Q. Okay. So all of your testing that was 22 performed in your declaration was on an actual 23 dental aligner; is that right? 24 A. Well, the physical testing was all done on 25 that dental aligner, correct.	Page 115 1 TIM ANDREAS OSSWALD, Ph.D. 2 Q. Right. 3 So if you look at claim No. 9 of the 4 '630 Patent, that reads "A dental appliance 5 conformal to one or more teeth comprising a 6 polymeric sheet composition according to claim 2"; 7 do you see that? 8 A. Yes. 9 Q. Okay. What is a dental appliance in the 10 context of claim 9? 11 MR. RENISON: Objection, calls for a legal 12 conclusion. 13 A. I mean, it says "a dental appliance" -- 14 something that is "conformal to one or more teeth 15 comprising a polymeric sheet composition according 16 to claim 2." 17 Q. So is it some kind of polymeric material 18 that's used in a dental application; is that fair? 19 MR. RENISON: Same objection. 20 A. In this case it's a product that is formed 21 from a sheet to conform to the teeth. 22 Q. It doesn't necessarily have to be formed 23 from a sheet, right? Strike that. 24 When you say "sheet," it could be either 25 the flat sheet or the thermoformed dental appliance
Page 116 1 TIM ANDREAS OSSWALD, Ph.D. 2 sheet, right? Sorry. That might not make sense. 3 The problem is like I just want to make sure like 4 when you say "sheet" for a polymeric sheet, what are 5 you referring to? 6 A. In this case here a multilayered sheet that 7 is formed into -- into an dental appliance. 8 Q. Okay. Is the dental appliance a polymeric 9 sheet? 10 MR. RENISON: Objection to the extent it 11 calls for a legal conclusion. 12 A. The dental appliance is a thermoformed 13 sheet. 14 Q. Okay. You have to forgive me because like 15 if you get a flat sheet, before it's thermoformed 16 obviously it's a sheet. Now, when the material is 17 thermoformed it's no longer a flat sheet, but it's 18 still a sheet, right, a polymeric sheet, it's just 19 in the shape of a dental aligner; is that fair? 20 MR. RENISON: Objection to the extent it 21 mischaracterizes prior testimony. 22 A. It's a flat sheet that was shaped into -- 23 into a -- into dental shapes. 24 Q. Right. According to claim 9, the dental 25 appliance, meaning the aligner, that you analyzed	Page 117 1 TIM ANDREAS OSSWALD, Ph.D. 2 has to comprise a polymeric sheet composition 3 according to claim 2 to infringe claim 9, right? 4 MR. RENISON: Same objection. 5 A. Well, claim 9 depends on claim 2 and 6 claim 2 depends on claim 1. 7 Q. Uh-huh. 8 A. So it starts out as a sheet composition 9 that has certain attributes that is then shaped into 10 a dental appliance. 11 Q. Right. And claim 9 is directed to the 12 actual dental appliance, right? 13 MR. RENISON: Same objection. 14 A. Yeah. A dental appliance conformal to one 15 or more teeth comprising the polymeric sheet that is 16 described in claim 2 and then in claim 1. 17 Q. Right. So what professional experience do 18 you have in your capacity as a professor designing 19 and making orthodontic or dental appliances, if any? 20 A. I have experience in thermoforming and I've 21 done some work in dental appliances more recently 22 and I've kept abreast in the -- in the field of 23 polymer applications to dental -- in the dental 24 field, but no, I'm not an expert in the field of 25 aligners. I'm not a dentist, I'm not an

Page 154 1 TIM ANDREAS OSSWALD, Ph.D. 2 cap A, cap B, cap C, may be comprised of a single 3 layer or multiple layers. So I don't see why I have 4 to take 1B and manipulate it and change it. 5 Q. But this is an embodiment on the right-hand 6 side of Exhibit 9 according to what you just said 7 that meets the description that is allowed for by 8 what is layer A, B, C cap, right? 9 MR. RENISON: Same objection. 10 A. The thing is I see figure 1B, and figure 1B 11 clearly explains what it is in there. There are all 12 kinds of possibilities in that. The picture that 13 you drew is not a picture in the patent. 14 Sure, there is -- if I look at this 15 description here, I can have cap A, cap B, and cap C 16 be single layers or multiple layers. It already 17 says it there. I don't see why we have to 18 manipulate figure 1B to arrive at your alleged 19 embodiment. 20 Q. Okay. My alleged embodiment. 21 A. Well -- 22 Q. That's great. No, no, no, that's what 23 you're saying. I got it. Is it an -- Is what's on 24 the right-hand side of Exhibit 9 an embodiment of 25 the '630 Patent?	Page 155 1 TIM ANDREAS OSSWALD, Ph.D. 2 MR. RENISON: Same objection. 3 MR. PIVOVAR: Just yes or no. 4 A. The embodiment in the '630 Patent is 5 described in figure 1B. 6 Q. Okay. And if you deviate from 1B it's no 7 longer an embodiment of the patent; is that your 8 opinion? 9 A. Well, the thing is I don't want to redraw 10 the figures in the patent. The words say it 11 already. The words say it. It says each layer, 12 that means single cap A, cap B, cap C, could be 13 single or it could be multiple. It's clearly 14 defined there. I don't see why -- I can have an 15 infinite number of figures here that I can start 16 drawing out and they would all be embodiments as 17 long as they are described within the patent, that 18 they cover in the patent and the claims. 19 Q. So they would all be embodiments, right? 20 MR. RENISON: Same objection. 21 MR. PIVOVAR: That's what you just said. 22 As long as I'm following the teaching they would be 23 embodiments within the patent. 24 A. Everything that is shown in figure 1B is 25 part of the patent, figure 1B, but I don't see why
Page 156 1 TIM ANDREAS OSSWALD, Ph.D. 2 we need to manipulate figure 1B to arrive at some 3 other thing that doesn't exist in the patent. 4 Q. I didn't ask you why we're doing something. 5 All I'm asking you is this. Is the image on the 6 right-hand side of Exhibit 9 an embodiment of the 7 '630 Patent? 8 MR. RENISON: Same objection. 9 MR. PIVOVAR: Is it an embodiment of the 10 '630 Patent? That's it. 11 MR. RENISON: Same objection. 12 A. It's not a figure that I find in the 13 patent. I can tell you I can take figure 1B as it 14 is there and I can read through it again and there's 15 a whole combination of embodiments, but I don't want 16 to start manipulating and taking layers out and 17 moving things around that is not in the patent. I'm 18 speculating then. 19 Q. Is the description in the figure on the 20 right-hand side of Exhibit 8 one of the embodiments 21 that's described in the '630 Patent? 22 MR. RENISON: Objection, mischaracterizes 23 the document. 24 A. The embodiment that you manipulated there 25 is -- the description I see is I don't need to	Page 157 1 TIM ANDREAS OSSWALD, Ph.D. 2 manipulate figure 1B to come up with different 3 layers. I mean, it says there clearly it has to 4 have at least three layers or more. 5 Q. Here's the thing. It's a straightforward 6 question. In Exhibit 9 on the right-hand side 7 there's a five-layer embodiment depicted; do you see 8 that? 9 MR. RENISON: Same objection, asked and 10 answered. 11 MR. PIVOVAR: Right. Little A, little A 12 prime, little B, little C prime, little C, right? 13 Do you see that? 14 A. Correct. 15 Q. Right? Is that an embodiment of the 16 '630 Patent? 17 MR. RENISON: Same objection, asked and 18 answered. 19 A. Yeah. I don't see -- I can say the same 20 thing describing figure 1B. Figure 1B describes 21 clearly five layers, it describes four layers, it 22 describes three layers, at least three layers, and 23 depending how you choose your multiple layers of 24 each one of the three layers that are there, you 25 could have all kinds of different combinations.

Page 174 1 TIM ANDREAS OSSWALD, Ph.D. 2 right? That's what we talked about in Exhibit 10? 3 A. But that's the '630 Patent -- 4 Q. Right. 5 A. -- that -- where the claim reads 6 differently. So this right here is the '263 Patent. 7 Q. Okay. So what is identified as "Layer B" 8 is different between the '630 Patent and the 9 '263 Patent, right? 10 A. If I go back and I look at -- if I look at 11 the '690 Patent -- '630 Patent, sorry, it says "at 12 least two outer layers A and C and an elastomeric 13 inner layer B." It requires one. I see 2 and 4 as 14 being elastomeric. I only need one, but I have two, 15 that's fine. The -- as I read the words in the 16 claim, right, it just says "an elastomeric inner 17 layer B." So okay. So both 2 and 4 are the inner 18 layer B, it's B. 19 The other patent, the '26- -- the 20 '263 Patent says I need at least two soft inner 21 layers B and B prime, and I see those. 22 Q. Uh-huh. 23 A. I see 2 and 4 and I'm -- and I read this 24 claim and I -- and I see it's fulfilled in that 25 claim as well.	Page 175 1 TIM ANDREAS OSSWALD, Ph.D. 2 Q. Right. So in your opinion with respect to 3 the '630 Patent at paragraph 100, right, at 4 paragraph 100; do you see that? 5 A. Yes. 6 Q. You're not identifying any of the layers in 7 the accused product as being layer B prime, are you? 8 A. Well, that claim itself only calls -- it's 9 a label, right. I'm just reading -- reading the 10 claim, right. "At least two outer layers A and C." 11 It doesn't even say which one has to, it just has to 12 be two of them, A and C. Could be A on the top, C 13 on the bottom or C on the top, A on the bottom. So 14 you can take your pick. And "an elastomeric inner 15 layer B," and I see an elastomeric inner layer B, I 16 see 2, and I also see an elastomeric inner layer B 4 17 and the label is B. 18 Q. I think I understand. I think I 19 understand. What you're saying is with respect to 20 the '630 Patent in Claim 1 there inner skin 2 and 21 inner skin 4 can both or either be layer B, right? 22 A. What I write there, right, it says "In my 23 opinion inner skin 2 and 4 correspond to inner layer 24 B." 25 Q. Okay. So 2 and 4 correspond to inner layer
Page 176 1 TIM ANDREAS OSSWALD, Ph.D. 2 B in the '630 Patent, but in the '263 Patent inner 3 skin 2 and inner skin 4 correspond to layer B and 4 layer B prime, right? 5 A. Because it requires -- it requires at least 6 two soft inner layers, and so the label there is 7 P -- B and B prime. 8 Q. So you change how you're identifying the 9 layers in the accused product because the claims 10 have different labeling schemes; is that right? 11 MR. RENISON: Objection to the extent it 12 mischaracterizes testimony. 13 A. No. I'm looking at the words in the claims 14 and I'm checking at the product and say, ah, okay, 15 yes, that's fulfilled. They're two different 16 patents. 17 Q. Okay. 18 A. Two different claims. 19 Q. So you don't have to have the same 20 identification of layer B between the '630 Patent 21 and the '263 Patent because they're different? 22 MR. RENISON: Same objection. 23 MR. PIVOVAR: I'm just trying to figure out 24 why you've identified different things as layer B 25 and then layer B prime?	Page 177 1 TIM ANDREAS OSSWALD, Ph.D. 2 MR. RENISON: Same objections. 3 A. Again, as I said, it's a label, right. I 4 mean, in fact, they're labeled 1, 2, 3, 4, 5. I 5 don't see anywhere A, B, C, and D or whatever in the 6 actual micrograph. The micrograph is not stamped 7 with B or B prime. It's a label. It's just says 8 two soft inner layers. It could be anything. 9 Q. It could be anything? 10 A. B and B prime here in this case, and 11 they're there. I see B and B prime or B prime and B 12 depending which way I look at them, but they are 13 there. The two patents, the two claims are 14 different. One of them requires one soft inner 15 layer, the other one requires two soft inner layers. 16 Q. Got it. 17 If you go back to figure 1B, please, is 18 there a layer B prime in figure 1B? 19 A. No. I mean, there is a -- there -- it's a 20 different -- it's a generalized figure, figure 1B. 21 I mean, it says it has three layers there, A, B and 22 C. It's a description of something that would be a 23 multilayer system. 24 Q. Okay. But if layer little B was an 25 elastomeric material, you could identify layer

Page 178 1 TIM ANDREAS OSSWALD, Ph.D. 2 little B as capital layer B, right? 3 MR. RENISON: Objection, beyond the scope. 4 A. I mean, I'm not a patent attorney and I'm 5 certainly not the one who wrote this patent, so -- 6 but I -- I think it's clear, right. I mean, I read 7 the claim how it's supposed to be read and it's 8 explained quite easily, right. I say "At least two 9 outer layers A and C and elastomeric inner layer B." 10 To me A and B, they're just labels, right. They 11 could be labeled any other -- any other way. It's 12 embedded here. It just happens that, sure, A and C 13 are the upper and lower here in this drawing, but 14 they're just labels. This is a description of what 15 properties the layer should have. 16 Q. Well, it's also giving you the order of the 17 layers, right? 18 A. Well, it's giving me that at least two 19 outer layers, A and C. 20 Q. So I'm kind of curious here. If layer 21 little B, right, was an elastomeric layer and it's 22 an elastomeric inner layer and layer B prime here 23 was another elastomeric inner layer, could I say 24 that I have two capital layer B's? 25 MR. RENISON: Same objection.	Page 179 1 TIM ANDREAS OSSWALD, Ph.D. 2 A. Well, I mean, you're asking me to speculate 3 with that -- with that figure, right. So I can tell 4 you right here I see -- I see a micrograph, I see a 5 diagram. I can tell you about that. This is real, 6 right. That what you have there is a hypothetical 7 case. 8 Q. It's not real in figure 1B? 9 A. It is -- it's a real figure, but you're now 10 adding labels, elastomeric and all of that. That's 11 not described in figure 1B. Figure 1B is quite 12 clear. It says "Each layer A, B, and C may be 13 comprised of a single or multiple layers." 14 Q. Right. And if layer B is comprised of 15 multiple layers, then I can identify multiple layer 16 B's, right? 17 A. In that figure you will have small B and 18 small B prime, correct. 19 Q. Right. And -- 20 A. Or more, or B double prime. 21 Q. Right. But if -- if I have any construct 22 that has two elastomeric layers inside an outer 23 shell, you can always identify those as layer B in 24 the '630 Patent. Is that kind of what your opinion 25 is?
Page 180 1 TIM ANDREAS OSSWALD, Ph.D. 2 MR. RENISON: Same objection. 3 A. My opinion is if you have an elastomeric 4 inner layer B, inner layer B, an elastomeric inner 5 layer, right -- 6 Q. Right. 7 A. -- then -- yeah, then it's present. Here I 8 see two. 9 Q. I'm a little confused because it seems to 10 me that you're saying that if I can find an 11 elastomeric layer inside the outer layers, then 12 that's automatically layer B. Is that kind of how 13 it plays out? As long as there's any elastomeric 14 layer inside two outer layers it satisfies the '630 15 claims? 16 MR. RENISON: Same objections. Objection, 17 form. 18 A. Can you ask the question again. 19 Q. Yeah. 20 Can you have a layer B in a multilayer 21 polymer sheet that is not elastomeric? 22 MR. RENISON: Same objections. 23 A. I mean, again, you're asking me some 24 hypothetical case, right. This reads -- let's look 25 at the '630 Patent, right. It's easy to read. At	Page 181 1 TIM ANDREAS OSSWALD, Ph.D. 2 least two outer layers A and C and an elastomeric 3 inner layer B, and it needs to be an elastomeric 4 inner layer B. It needs to be an elastomeric inner 5 layer. In this case it's an elastomeric inner layer 6 2 or an elastomeric inner layer 4 is -- are what are 7 described as B in the -- in the claim. 8 Q. But layer B could also be a material that's 9 rigid and hard and not an elastomer, right? 10 MR. RENISON: Objection, form, beyond the 11 scope. 12 A. The thing is that's a hypothetical case, 13 right. So here we're talking about an elastomeric 14 inner layer B. If the -- if layers 2 and 4 were 15 steel, yeah, then they wouldn't be. 16 Q. Right, but -- 17 A. Then they would be an elastomeric inner 18 layer B. 19 Q. Right. 20 A. But that's hypothetical. Here we have a 2 21 and a 4, they are elastomeric, they are inside. 22 Therefore they satisfy an elastomeric inner layer B. 23 Q. Got it. Got it. 24 And then can you go back to the '630 Patent 25 really quick. I just want to make sure I have this

Page 210 1 TIM ANDREAS OSSWALD, Ph.D. 2 right, it's outside the scope of the claim -- of 3 claim 2 because it's too thick, it's above the about 4 2,000, right, and I thermoform that into the range 5 of the patent claims where after it thins out it has 6 a thickness of 1,800 -- 7 MR. RENISON: Objection, beyond the scope. 8 Q. -- could that happen? 9 A. Then -- 10 MR. RENISON: Objection, beyond the 11 scope -- 12 MR. PIVOVAR: Then what? 13 MR. RENISON: -- calls for a legal 14 conclusion. 15 THE REPORTER: Guys. 16 A. Again, it's a hypothetical case, right. 17 And so if you look at the original sheet that is 18 over 2,000, it doesn't fall within it, but, again, 19 I'm not a judge to say when do we do the 20 measurement, after forming or before forming. But 21 the way I read it here, it's the sheet. 22 Q. Right. So your opinion is this for claim 23 9, right? For claim 9 it's the actually 24 thermoformed aligner, right, that is the dental 25 appliance, but when I look at the thickness, I look	Page 211 1 TIM ANDREAS OSSWALD, Ph.D. 2 at the thickness of the preformed sheet for 3 infringement; is that right? 4 A. Well, the way I see it is -- 5 Q. I'm just -- 6 A. I'm explaining it to you. Claim 1 talks 7 about a sheet, 3M starts out with a sheet, right, 8 that has certain layer compositions and it does have 9 those and it has a certain thickness, it has those 10 too. Then we see claim 9 and claim 9 says "a dental 11 appliance conformal to," et cetera, et cetera. So 12 yes, it's a dental appliance that started out as a 13 sheet. 14 Now, if it's 3 -- but it's not 3D printed. 15 It wasn't 200 millimeters or 2,500 millimeters 16 thick. So -- 17 Q. All right. I just want -- 18 A. -- these are all hypotheses. 19 Q. Okay. So in claim 9 it says -- bear with 20 me and try to stick with this. It says "A dental 21 appliance conformal to one or more teeth," right? 22 Do you see that? 23 A. Correct. 24 Q. Right? And what you're saying satisfies 25 the "A dental appliance conformal to one or more
Page 212 1 TIM ANDREAS OSSWALD, Ph.D. 2 teeth" is a thermoformed Clarity Flex Aligner dental 3 appliance, right? 4 A. Yes. 5 Q. Right? And then it says in claim 9 6 "Comprising a polymeric sheet composition according 7 to claim 2," right? 8 A. Correct. 9 Q. Right? And you're saying, so I understand 10 this, that when I look at claim 2 and the 11 thicknesses that are required to satisfy claim 2, I 12 can look at the pre-thermoformed polymeric sheet to 13 satisfy the thickness range of claim 2, right? 14 MR. RENISON: Objection, calls for a legal 15 conclusion. 16 A. I mean, the way I did the analysis was 17 back-correct the number to the value that was before 18 thermoforming. 19 Q. Right. So you were -- you were relying on 20 for claim 9 the thermoformed Clarity Aligner Flex 21 dental appliance to satisfy the "dental appliance 22 conformal to one or more teeth" requirement, and 23 then for the thickness portion of claim 2 you're 24 relying on the pre-thermoformed thickness of the 25 Clarity Aligner sheet, right?	Page 213 1 TIM ANDREAS OSSWALD, Ph.D. 2 A. Correct. 3 MR. RENISON: We've been going a little 4 over an hour. 5 MR. PIVOVAR: Yeah. Let's go off the 6 record. 7 MR. RENISON: Okay. 8 THE VIDEOGRAPHER: We are off the record at 9 3:11. 10 (A short break was had.) 11 THE VIDEOGRAPHER: We are back on the 12 record at 3:34. 13 BY MR. PIVOVAR: 14 Q. Dr. Osswald, can you please go to 15 Exhibit 2, which are your exhibits to your 16 declaration, and go the Exhibit No. M, please. 17 A. M? 18 Q. M as in Mary. Do you see in Exhibit M 19 that's the technical data sheet for Eastman Tritan 20 co-polyester MX710? 21 A. Yes. 22 Q. All right. And then do you see as part of 23 the technical data sheet it says "Typical 24 properties"; do you see that? 25 A. I see that.

Page 214 1 TIM ANDREAS OSSWALD, Ph.D. 2 Q. Right. And then under the "Mechanical 3 properties" it says "ISO method"; do you see that? 4 A. Yes. 5 Q. Do you understand what "ISO method" means? 6 A. Yes. 7 Q. What does it mean? 8 A. International systems organization. It's 9 an international standards organization. 10 Q. Right. Then if you go down a few lines do 11 you see where it says "Flexural modulus ISO 178"; do 12 you see that? 13 A. Yes. 14 Q. So that's identifying the property of 15 flexural modulus and the test method according to 16 ISO 178, right? 17 A. Correct. 18 Q. And then if you go down a little bit 19 further underneath the mechanical properties part; 20 do you see that? 21 A. Yes. 22 Q. If you go down a little bit further there's 23 another flexural modulus, right? 24 A. Yes. 25 Q. You see there it says "Flexural modulus	Page 215 1 TIM ANDREAS OSSWALD, Ph.D. 2 D790," right? 3 A. Yes. 4 Q. So that's using the test method according 5 to ASTM D790, right? 6 A. Yes. 7 Q. So there's at least two different standards 8 for determining flexural modulus, right? 9 A. Yes. 10 Q. How many other accepted methods are there 11 for determining a flexural modulus of a material? 12 MR. RENISON: Objection, form. 13 A. Well, I mean, in the ASTM standards the 14 D790 is the method to measure it, and in the ISO 15 norms the 178 is the way to measure it. Those are 16 the standard methods of doing it. Then there is 17 likely one more, the DIN, the German industrial 18 norms, which also will measure the flexural modulus, 19 but the most accepted ones today are the ISO and the 20 ASTM. 21 Q. Okay. And then I guess besides those three 22 are there any other methods that could be used to 23 determine a flexural modulus? 24 A. Well, you can cut your samples any way you 25 want and do them outside of the norms.
Page 216 1 TIM ANDREAS OSSWALD, Ph.D. 2 Q. I'm going to go back to the '630 Patent, 3 which is Exhibit 5, I believe. So in column 6 of 4 the '630 Patent there's a section called 5 "Definitions"; do you see that? 6 A. Yes. 7 Q. Okay. Now, down at the bottom at column 6, 8 line 60 it says the term "Hardness"; do you see 9 that? 10 A. Yes. 11 Q. Can you read that paragraph and let me know 12 when you've finished, please. 13 A. "The term hardness" -- 14 Q. You don't have to -- 15 A. Oh, I see. Never mind. Yeah. 16 Okay. 17 Q. So do you see on the bottom of column 6 the 18 very last sentence begins "Shore hardness"; do you 19 see that? 20 A. Yes. 21 Q. Can you read that sentence into the record, 22 please. 23 A. "There are different durometer scales, but 24 Shore A and Shore D are commonly used." 25 Q. Actually I'm sorry. At the very last line	Page 217 1 TIM ANDREAS OSSWALD, Ph.D. 2 of that it's a sentence that begins "Shore hardness 3 and modulus are" and then it goes on. If you would 4 read that one into the record, I would appreciate 5 it. 6 A. "Materials with higher durometer values 7 will be harder compared to materials with lower 8 durometer value. Shore hardness and modulus are 9 generally correlated and can be converted by 10 approximation if only one value is known by methods 11 described in the art." 12 Q. Okay. Do you understand what that last 13 sentence describing a correlation is referring to? 14 A. Yes. 15 Q. Okay. So what are the methods described in 16 the art for correlating Shore hardness and modulus? 17 MR. RENISON: Objection, outside the scope. 18 A. Yeah. I mean, I see a general -- there's a 19 general correlation between hardness and modulus if 20 you do -- several measurements have several 21 materials. There's a certain tendency of materials 22 that are harder to be stiffer and materials that are 23 softer to be more compliant, but I mean, there is -- 24 that's why it says a general correlation. There's 25 not really a straight line that correlates one to

Page 226 1 TIM ANDREAS OSSWALD, Ph.D. 2 material is too soft you probably couldn't use the 3 flexural modulus, you'd have to use a tensile 4 modulus or do another test, but yeah, I mean, they 5 are nearly interchangeable. We can see that here 6 with the MX710. 7 I mean, if it's 1548 or if it's 1495, well, 8 they're pretty similar numbers. So you can 9 basically say either one will give you a relatively 10 accurate modulus. Which one is correct I don't 11 know. 12 Q. For anisotropic materials would you expect 13 the flexural modulus and the elastic modulus to be 14 different? 15 MR. RENISON: Objection, form. 16 A. Well, if you have -- I mean, if we're 17 talking -- going back to the patent, if we have -- 18 if we have a layered system, which means different 19 properties in different layers, sure, you're going 20 to get a different value for tensile modulus than 21 you will get for bending because the layer -- 22 position of the layer will affect the flexural 23 modulus, but it won't affect the tensile modulus, 24 which is, again, something I write in my report. I 25 can point you. In paragraph 38 I discuss that.	Page 227 1 TIM ANDREAS OSSWALD, Ph.D. 2 Q. In paragraphs roughly -- well, starting in 3 paragraph 39, let's just go there. In this portion 4 of your report you're giving some equations and a 5 description for how the flexural modulus of a 6 multilayer polymeric sheet can be computed, right? 7 A. Correct. 8 Q. Okay. And do these equations that you're 9 relying on in this section come from a textbook or 10 any other source other than your report? 11 A. Yes. They are -- there is -- there is a 12 reference that I use. I think it's Exhibit E. I 13 don't remember exactly which exhibit it is. 14 Q. Yeah, I think that's it. 15 A. Yes. 16 Q. Yeah. So I looked at that and I couldn't 17 see where your equations were actually in Exhibit E. 18 So can you help me understand where they are, 19 please, or like point me to where your equations in 20 paragraph kind of 42 on are located in Exhibit E. 21 A. Actually they're not in here. There's an 22 equation 4.27 and the ratio of the moduli. It's for 23 two materials, but it's still the same. 24 Q. I'm sorry. Can you -- oh, 4.27 in 25 Exhibit --
Page 228 1 TIM ANDREAS OSSWALD, Ph.D. 2 A. E. Then there's an example 4.03 that 3 shows -- it's just basic mechanics, but I mean, you 4 can probably find it somewhere else. 5 Q. Okay. So the actual equations that you 6 have in your report are equations you derive for 7 performing the calculations? 8 A. No. I took them from somewhere else. I 9 don't see them in there, but I need to check the 10 reference I had. Maybe something different went in 11 there. 12 Q. So you don't see them in Exhibit E? 13 A. No, not the exact ones. 14 Q. In paragraph 47 -- 15 A. Yes. 16 Q. -- so there's an equation there that says E 17 equals a few other things? 18 A. Yes. 19 Q. Now, that's an elastic modulus calculation 20 for a multilayer sheet? 21 A. Correct. 22 Q. Okay. And is that the modulus parallel to 23 the plane of the sheet or perpendicular to the plane 24 of the sheet? 25 A. It's if you cut a sample out of the sheet	Page 229 1 TIM ANDREAS OSSWALD, Ph.D. 2 and you stretch it that's what you would get. It's 3 parallel to a plane of the sheet. 4 Q. It's in the parallel plane of the sheet? 5 A. Yes. 6 Q. And why -- strike that. 7 Is this the same equation you would use to 8 determine the elastic modulus in the direction 9 perpendicular to the plane of the sheet? 10 A. No. Perpendicular, that means through 11 the -- across the thickness? 12 Q. Yeah. 13 A. No. 14 Q. Oh, it would be a different equation? 15 A. This would be the modulus of stretching a 16 sheet. 17 Q. Okay. So it's the elastic modulus of 18 stretching a sheet? 19 A. Correct. 20 Q. And then not the elastic modulus I guess of 21 stretching a sheet in the perpendicular direction? 22 MR. RENISON: Objection, form. 23 A. No. It would be -- so this is the elastic 24 modulus. If you cut a sample out of the sheet, a 25 long strip, and you stretch it, then you do a

Page 230 1 TIM ANDREAS OSSWALD, Ph.D. 2 weighted average of the modulus, that's what we're 3 doing there, according to the thickness and the 4 modulus of each layer and then dividing it by the 5 total thickness. That's the weighted average across 6 the thickness. So that's where the springs, if you 7 want to look at them as springs, are parallel to 8 each other, and if you have -- if you're calculating 9 the modulus by pressing on the -- or stretching 10 across the thickness, there they would -- the 11 springs would be in series, not parallel to each 12 other. 13 Q. For a dental appliance wouldn't the elastic 14 modulus in both the thickness direction and the in 15 plane direction impact performance? 16 MR. RENISON: Objection, form, outside the 17 scope. 18 A. I have not done a finite element analysis 19 of a dental appliance. Bending plays a role and 20 that's why a flexural modulus is discussed in this 21 patent. 22 Q. So bending is pushing down on the sheet, 23 right? 24 A. Bending is like the 790 flexural test. 25 Q. Right. Or the ISO 178, right?	Page 231 1 TIM ANDREAS OSSWALD, Ph.D. 2 A. Correct. 3 Q. So if I'm pressing on the -- like I'm doing 4 the bending, I'm pressing like on the sheet 5 (indicating), isn't that somewhat more consistent 6 with an elastic modulus in the thickness direction 7 rather than the longitudinal direction? 8 MR. RENISON: Objection, form. 9 A. Not necessarily, no. A specimen that is 10 being bent the upper surfaces are compressed in the 11 direction parallel to the sheet and the lower 12 surfaces are stretched, and somewhere in the 13 middle -- if it's a single material somewhere in 14 the -- right exactly in the center it's not 15 stretched at all. That's the neutral axis. 16 So there is a combined compression and 17 tension. That's one of the reasons why sometimes 18 the elastic modulus is slightly different than the 19 flexural modulus because elastic modulus you only 20 stretch, flexural modulus you stretch and compress. 21 Q. So if I have a isotropic single polymer 22 material and I put it into bending like a flexural 23 modulus test, this -- the center line of that will 24 have no compression or tension, right? 25 A. Correct.
Page 232 1 TIM ANDREAS OSSWALD, Ph.D. 2 Q. Okay. But if I have a multilayer polymer, 3 I guess the line where there's no strain, that's not 4 necessarily right in the middle anymore, is it? 5 MR. RENISON: Objection, form. 6 A. Only if it is a symmetric part. 7 Q. And I guess -- so if you could bear with me 8 and go to paragraph 39. I think that on the 9 left-hand side there's a line that says "H"; do you 10 see that? 11 A. Yes. 12 Q. And then right next to that there's a line 13 that says -- I think it's capital Y with a bar over 14 it? 15 A. Yes. 16 Q. And is that the -- like the part of this 17 layer depicted that would have like no strain? 18 A. Correct. That's the neutral axis. 19 Q. Neutral axis, that's what it's called. 20 Thank you. 21 So in table 1 of the '630 Patent, 22 column 14, Dr. Osswald, do you see there it says 23 "Modulus range" in that table? 24 A. Yes. 25 Q. Now, if you -- I'm sorry to do this	Page 233 1 TIM ANDREAS OSSWALD, Ph.D. 2 backwards, but if you go back to column 7, line 16, 3 it says "Unless designated otherwise, 'modulus' 4 refers to elastic modulus"; do you see that? 5 A. I see that. 6 Q. Okay. And then when we look in table 1, it 7 just says "Modulus range," right? 8 A. Yes. 9 Q. Right. So that's referring to an elastic 10 modulus because it's only saying modulus according 11 to the patent; do you understand that? 12 A. I'm not sure. I'd have to read back here. 13 It could be flexural modulus. 14 Q. But did you see what we read in column 7 15 where it says "Unless designated otherwise, 16 'modulus' refers to elastic modulus"? 17 A. Okay. Yes. I see it there, yes. 18 Correct. 19 Q. And here it just says modulus, not flexural 20 modulus? 21 A. Yes, I see that. Yeah. They're probably 22 referring to the modulus. 23 Q. The elastic modulus, right? 24 A. Yeah. Yeah. 25 Q. Okay. And then for the materials in

Page 234 1 TIM ANDREAS OSSWALD, Ph.D. 2 table 1 would the flexural modulus be the same as 3 the elastic modulus? 4 MR. RENISON: Objection, outside the scope. 5 A. All I can tell you is what I wrote in my 6 report and what it says in there, that flexural 7 modulus and elastic modulus for single materials are 8 relatively similar. I mean, you can see that in 9 that one data sheet that we had for the MX710 there 10 was a difference of maybe 50 or so compared to 11 1,500. So they're relatively the same for single 12 materials. 13 Now, for layered -- multilayered materials 14 the flexural modulus and the elastic modulus are not 15 necessarily the same. It depends how the layers are 16 arranged, but elastic modulus doesn't depend on how 17 the layers are arranged. 18 Q. So I'd like to go back to paragraph 19 of 19 your declaration. Please let me know when you get 20 there. 21 A. I'm there. 22 Q. Okay. Now, you understand that the 23 '263 Patent is a continuation in part application 24 from -- let me just leave it at that, it's a 25 continuation in part application of this	Page 235 1 TIM ANDREAS OSSWALD, Ph.D. 2 '511 Patent; do you see that? 3 MR. RENISON: Objection to the extent it 4 calls for a legal conclusion. 5 A. That's what I was informed by the 6 attorneys. 7 Q. Okay. So if you read down in there, it 8 says "The '263 Patent was filed on December 22, 2020 9 as U.S. Patent Application No. 16/719,256 (the '256 10 application), and it is a continuation in part 11 application of U.S. Patent No. 10,549,511"; do you 12 see that? 13 A. Yes, I see that. 14 Q. All right. So the '263 Patent is a 15 continuation in part application. Do you have an 16 understanding of what a continuation in part 17 application is? 18 MR. RENISON: Same objection. 19 A. No. I was informed by counsel that that's 20 the case, that I just take it as a continuation of a 21 prior application. So it's related to that patent. 22 Q. Okay. Do you understand what a 23 continuation in part application is just from your 24 perspective? I know you've been informed. 25 MR. RENISON: Same objection.
Page 236 1 TIM ANDREAS OSSWALD, Ph.D. 2 A. I think what the words say there, right, 3 it's a continuation in part -- 4 Q. Then you write -- 5 A. -- application. 6 Q. I'm sorry. I thought you were done. 7 All right. You write in the last sentence, 8 you say "The '263 Patent includes the same 9 specification as the '630 Patent, with some 10 additional material included"; do you see that? 11 A. Yes. 12 Q. Okay. And then you said "For purposes of 13 my discussion below, I have referred to the 14 '630 Patent specification unless otherwise 15 indicated," right? 16 A. Yes. 17 Q. Okay. So you understand that there was new 18 material added to the '263 Patent application in 19 comparison to the '630 Patent, right? 20 A. Yes. 21 Q. Now, in paragraph 21 of your report -- 22 A. Yes. 23 Q. -- your first sentence is "The '630 and 24 '263 Patent inventors solved the existing issues by 25 creating aligners using inventive multilayer	Page 237 1 TIM ANDREAS OSSWALD, Ph.D. 2 polymeric sheet compositions having hard or rigid 3 outer layers made for contact with a user's teeth 4 and soft inner layers comprised of an elastic 5 material"; do you see that? 6 A. Yes. 7 Q. So the inventive multilayer polymeric sheet 8 composition here has hard or rigid outer layers made 9 for contact with the user's teeth and softer inner 10 layers comprised of an elastic material in the 11 '630 and '263 Patents, right? 12 A. Correct. 13 Q. Now, if you turn over to a little bit 14 further on in paragraph 21, you say "The outer 15 layers of the inventive multilayer polymeric sheet 16 compositions contain a thermoplastic polymer having 17 a flexural modulus of between 1,000 to 2,500 MPA and 18 the inner elastomeric layers contain elastomeric 19 materials having a flexural modulus of between 50 to 20 500"; do you see that? 21 A. I see it. 22 Q. Okay. So that's describing hard or rigid 23 outer layers with soft elastomeric inner layer, 24 right? 25 A. Correct.

Page 238 1 TIM ANDREAS OSSWALD, Ph.D. 2 Q. Now, did you -- and then you see here it 3 says "Id. at 526-36," right? Do you see that? 4 A. I see it. 5 Q. That's citing to the '630 Patent? 6 A. Yes. 7 Q. Right. And did you write that sentence? 8 A. Yes. 9 Q. Okay. And is that an accurate description, 10 as far as you know, of what's disclosed at 5:26-36 11 of the '630 Patent? 12 A. Yes. It's the definition between hard and 13 soft, which I think that's what I'm referring to 14 here. That's defined in the -- in the abstract 15 already of the patents. 16 Q. What's defined in the abstract of the 17 patent? 18 A. It says -- in the abstract it says 19 "Comprised of a material having a modulus of from 20 about 1,000 to 2,500 MPAAhard') and an inner core 21 comprised of elastomeric material or materials 22 having a modulus from about 50 to 500 megapascals 23 ('soft')." 24 Q. I see. So this is defining hard as between 25 1,000 and 2,500 MPA and soft as 50 and 500 MPA; is	Page 239 1 TIM ANDREAS OSSWALD, Ph.D. 2 that right? 3 A. Correct. 4 Q. And that's the invention that's described 5 in the abstract of the '630 Patent, right? 6 MR. RENISON: Objection to the extent it 7 mischaracterizes the document. 8 A. Yeah. That's what it -- that's what it 9 says in the abstract. 10 Q. Okay. In looking at -- let's go and look 11 at column 5:26-36 that you cited in your report in 12 paragraph 21. If you could just read that paragraph 13 in the patent and let me know when you're done, that 14 would be great. 15 (Witness reviewing document.) 16 A. Yep, I see that. 17 Q. Okay. I just had a couple of questions. 18 The first thing is in your declaration you're 19 referring to flexural modulus, but in this paragraph 20 it's just referring to modulus which the patent is 21 saying is elastic modulus? 22 A. Yeah. Since -- since they are -- well, I'm 23 talking there about the outer layer and the inner 24 layer. If I'm talking about flexural modulus or 25 elastic modulus, I mean, they're going to be very
Page 240 1 TIM ANDREAS OSSWALD, Ph.D. 2 similar. 3 Q. That's fine. And then you see it says "An 4 inner elastomeric layer or core comprised of an 5 elastomeric material or materials having a modulus 6 from about 50 MPA to 500 MPA"? 7 A. Yes. 8 Q. So it's referring to the inner elastic -- 9 strike that. 10 It's referring to the inner elastomeric 11 layer synonymously with the core, right? 12 A. Correct. 13 Q. Now, in the -- 14 A. And it does say modulus in column 5. 15 Q. Yeah. Jut modulus, right, not flexural 16 modulus? 17 A. Correct. Also in the abstract. That may 18 have been my -- I mean, they're interchangeable at 19 least in general. 20 Q. Well, they're interchangeable in general. 21 This is really the question I have is if I have a 22 material and I only know the elastic modulus, can I 23 use the elastic modulus as the flexural modulus in 24 the claims? 25 MR. RENISON: Objection, beyond the scope,	Page 241 1 TIM ANDREAS OSSWALD, Ph.D. 2 calls for a legal conclusion. 3 A. Well, the claims themselves talk about an 4 elastic modulus. I have to go and see the actual 5 claim. I mean, the claims say "Having a flexural 6 modulus from about 1,000 to 2,500 and the inner 7 layer B comprised of an elastomeric material having 8 a hardness from A80 to D75 and then the combined 9 flexural modulus." The reason is because some of 10 the soft materials they're harder to measure the 11 flexural modulus. So one uses the hardness. 12 Q. In Claim 1 of the '630 Patent it says, you 13 know, "At least two outer layers and an elastomeric 14 inner layer B"; do you see that? 15 A. I see that. 16 Q. What does "elastomeric" refer to in that 17 claim? 18 MR. RENISON: Objection, calls for a legal 19 conclusion. 20 A. Well, I mean, elastomeric means -- here it 21 refers to a softer material, to a thermoplastic 22 elastomer or to an elastomer. 23 Q. Is there -- let me strike that and start 24 over. 25 A. In the abstract in the patent they define

Page 246 1 TIM ANDREAS OSSWALD, Ph.D. 2 comparing the elastic moduli, right? 3 MR. RENISON: Objection, form. 4 A. Sure. The patent talks about what they 5 call soft and what they call hard and they define 6 it, but ultimately when they go to the claim it's 7 defined by hardness, which is a typical thing to do 8 when you deal with elastomers. I mean, I didn't 9 dissect and analyze the patent if -- I mean, I 10 looked at the patent history, I looked at the 11 claims, I compared the claims to the product. And 12 so the definition -- I find the definition actually 13 of hardness a standard way of defining material 14 properties of elastomeric materials. People do 15 that. 16 Q. Agreed. The only thing I'm having a little 17 bit of a hard time is is that how can I say my 18 overall construct has this kind of general hard, 19 soft, hard format that the patent is teaching when I 20 have the outer layers defined as elastic moduli and 21 the inner layers are hardness, they're just on two 22 different scales. So that's where I'm just trying 23 to figure out if there's a way for us to compare 24 them on the same scale, but that's just my question. 25 Is the intention or is the range of	Page 247 1 TIM ANDREAS OSSWALD, Ph.D. 2 hardness from A80 to D75 that's in the claim meant 3 to be -- you know, a soft elastomeric inner 4 layer B? 5 MR. RENISON: Objection, form, calls for a 6 legal conclusion. 7 A. It is what it is, right, it's an 8 elastomeric material. So that would be an 9 elastomer, material that is compliant. What the 10 modulus is maybe sometimes hard to measure, but it's 11 defined by its hardness. Elastomers are 12 polyurethanes and all these elastomers are all 13 defined by their hardness. They're harder and 14 they're softer elastomeric materials and they say in 15 the claim here that it's between A80 and D75. It is 16 what it is. 17 I mean, I'm not questioning the validity. 18 I mean, that's -- that's a standard thing that 19 people do to define elastomeric materials and they 20 happen to be elastomeric materials in the center -- 21 or inside, the inside layer. 22 Q. Looking at table 1 of the '630 Patent, this 23 is in column 14, Dr. Osswald; do you see that? 24 A. I see it. 25 Q. So table 1 says "Exemplary materials useful
Page 248 1 TIM ANDREAS OSSWALD, Ph.D. 2 as primary components of A or C materials," right? 3 Do you see that? 4 A. I see that. 5 Q. And we talked about how the abstract 6 defines hard as being between 1,000 and 2,500 MPA, 7 right, for the outer layers? 8 A. Correct. 9 Q. And these are materials that are hard in 10 the context of the patent's definition that can be 11 used for the outer layers A or C, right? 12 A. Correct. 13 Q. Now, if you look in table 2, right, it says 14 "Exemplary materials useful as primary components of 15 B materials"; do you see that? 16 A. I see that. 17 Q. Okay. And these are materials that are the 18 elastomeric -- sorry -- the inner core comprised of 19 elastomeric material or materials having a modulus 20 from about 50 to 500 MPA or "soft" in the abstract, 21 right? 22 MR. RENISON: Objection, calls for a legal 23 conclusion. 24 A. I see a list of elastomers there. 25 Q. Right. And these all have moduli	Page 249 1 TIM ANDREAS OSSWALD, Ph.D. 2 identified between 50 and 500 MPA, right? 3 A. They do. 4 Q. Right. And these would be, then, the 5 elastomeric materials identified in the abstract and 6 defined as being "soft," right? 7 A. In the abstract those are defined as 8 soft -- soft elastomers, elastomeric materials. 9 MR. PIVOVAR: We can go off the record. 10 It's probably about time. 11 MR. RENISON: It's been about an hour. 12 Okay. 13 THE VIDEOGRAPHER: We are off the record at 14 4:31. 15 (A short break was had.) 16 THE VIDEOGRAPHER: We are back on the 17 record at 4:51. 18 BY MR. PIVOVAR: 19 Q. Dr. Osswald, if you can go to table 1 of 20 the '630 Patent again, please, and do you see 21 there's -- we kind of went over there, but on the 22 left-hand side there's a trade name for various 23 different polymers and then right next to it there's 24 a supplier column identified, right? 25 A. Yes.

Page 250 1 TIM ANDREAS OSSWALD, Ph.D. 2 Q. And these were all products that were 3 commercially -- well, strike all that. 4 These were all materials that were 5 commercially available from vendors at the time of 6 the '630 Patent, right? 7 MR. RENISON: Objection, outside the scope. 8 A. I mean, there's a supply -- supplier. So 9 they must have gotten those materials from those 10 suppliers. 11 Q. Right. And then you could look up the data 12 sheets or get the data sheets from the vendor to 13 get, you know, information about the mechanical and 14 other properties of the materials that are listed in 15 table 1, right? 16 MR. RENISON: Objection, form. 17 A. Yes, you could -- I'm -- they likely got 18 the data from the -- from the data sheets. I'm 19 assuming. 20 Q. Right. 21 A. It's an assumption. 22 Q. Right. 23 And then the same thing for the materials 24 in table 2, there's commercially available polymers 25 by trade names and suppliers, right?	Page 251 1 TIM ANDREAS OSSWALD, Ph.D. 2 A. Correct. 3 Q. All right. And you would also be able to 4 get the information about their properties from the 5 vendor, right? 6 MR. RENISON: Same objection. 7 A. I mean, they may have gotten it from the 8 vendor, they may have measured it, I'm not sure, but 9 yeah, you prob- -- you likely could get a data 10 sheet. Sometimes the data sheets have things 11 missing. So it's not always in the data sheet. 12 Q. Right, but a person of ordinary skill in 13 the art would have known of all of these materials 14 as of this filing date of the '630 Patent, right? 15 MR. RENISON: Same objection and outside 16 the scope. 17 A. A person of ordinary skill in the art may 18 have done some research and figured out about those 19 materials. 20 Q. Right. And none of these materials that 21 are listed in table 1 or 2 are polymers that were 22 synthesized by the inventors and Bay Materials, are 23 they? 24 MR. RENISON: Objection, form. 25 A. Not to my knowledge.
Page 252 1 TIM ANDREAS OSSWALD, Ph.D. 2 Q. Now, I want to go back to your equations 3 for the flexural modulus. I think these are around 4 paragraph 39. Okay. So the equations that you're 5 relying on to calculate the flexural modulus rely on 6 an application of elastic beam theory, correct? 7 A. Can you repeat the question. 8 Q. Yeah. I said -- 9 MR. PIVOVAR: Actually, can you read that 10 back, please. 11 (Record read as requested.) 12 MR. RENISON: Objection, form. 13 A. Yes. It's an elastic bending analysis of a 14 beam, correct. 15 Q. Okay. Can you explain what that is? 16 MR. RENISON: Same objections. 17 A. In this case here the specimen is -- like 18 the 790 test is put between two supports and is 19 pushed down in the middle like I drew in my diagram 20 earlier in the report. 21 Q. Okay. And now your equations also rely on 22 an application of the parallel axis theorem, 23 correct? 24 MR. RENISON: Same objection. 25 A. The equations all assume that the layers	Page 253 1 TIM ANDREAS OSSWALD, Ph.D. 2 are aligned in the plane of the -- of the beam. 3 Q. Right. So you're relying on the parallel 4 axis theorem, right? 5 A. Correct. 6 MR. RENISON: Same objection. 7 Q. Okay. So what is the parallel axis 8 theorem? 9 A. I don't know in a name if I were to call it 10 that, but basically here we have layers that all lie 11 horizontally. Basically if it's a sheet or a plate 12 that is multilayered, we cut a sample and the layers 13 all run parallel to the plane of that -- of that 14 sheet. 15 Q. So let me ask you some other questions. 16 When were you first hired by Bay Materials for this 17 case? 18 A. In the summer of last year. 19 Q. So summer of 2021? 20 A. Correct. 21 Q. Okay. And then how much time have you 22 spent working on this case since the summer of last 23 year? 24 A. I don't remember. 25 Q. In Claim 1 of the '630 Patent do you see

Page 254 1 TIM ANDREAS OSSWALD, Ph.D. 2 that the hardness -- it recites that "The inner 3 layer B is comprised of an elastomeric material 4 having a hardness from about A80 to D75"; do you see 5 that? 6 A. Correct. 7 Q. All right. Okay. 8 Now, in Exhibit 2 Exhibit C to your 9 declaration is a copy of the '263 Patent; do you see 10 that? 11 A. '263? 12 Q. Uh-huh. 13 A. Yeah. 14 Q. Okay. And then if you can go to Claim 11 15 in the '263 Patent, please. 16 A. Yes. 17 Q. Then do you see there it says "The soft 18 inner layers B and B prime individually comprise an 19 elastomeric material having a hardness from about 20 A60 to D85"; do you see that? 21 A. I see that. 22 Q. Okay. So in the '630 Patent the hardness 23 range was from A80 to D75, right? 24 A. Correct. 25 Q. And then in the '263 Patent it's from A60	Page 255 1 TIM ANDREAS OSSWALD, Ph.D. 2 to D85, right? 3 A. Correct. 4 Q. And that's a broader range for hardness in 5 the '263 Patent in comparison to the '630 Patent, 6 right? 7 MR. RENISON: Objection, form. 8 A. It goes lower on the -- on the A scale and 9 a little bit higher on the D scale, yes. 10 Q. Uh-huh. And, in fact, when you see in 11 Claim 11 it says from A60 to D85, right? 12 A. Correct. 13 Q. That goes so high actually that if you turn 14 to table 1 of the '263 Patent in column 17, do you 15 see where it says "Trogamid CX7323"; do you see 16 that? 17 A. I see it. 18 Q. Right. And do you see on the hardness 19 range it says D81, right? 20 A. Correct. 21 Q. Right. And that would fall within the 22 scope of the hardness recited in Claim 1 of the '263 23 Patent, right? 24 MR. RENISON: Objection, form, calls for a 25 legal conclusion.
Page 256 1 TIM ANDREAS OSSWALD, Ph.D. 2 A. All I -- all I know is I'm reading here 3 that layers B and B prime individually comprise an 4 elastomeric material, so an elastomeric material 5 having a hardness from such and such. This Trogamid 6 is not an elastomeric material. 7 Q. Okay. What is -- strike that. 8 How are you defining what an elastomeric 9 material is? 10 MR. RENISON: Objection, form. 11 A. Elastomeric material is like thermoplastic 12 elastomers with all kinds of ranges and hardness, 13 materials that are more compliant. 14 Q. Well, you just told me that Trogamid is not 15 an elastomeric material, right? 16 A. Right. Trogamid also has a modulus there 17 of 1,400 megapascals. So this is a much stiffer 18 material which may have -- which may be a little bit 19 softer, I don't know, but the Trogamid is a material 20 that falls within the range of materials A and C. 21 And the other materials below, the table below are 22 the elastomeric materials that have -- that are 23 defined by their -- by their hardness. 24 Q. What is the -- okay. Where in the patent 25 is there a description of any elastic material that	Page 257 1 TIM ANDREAS OSSWALD, Ph.D. 2 can be used as the elastomeric material in Claim 1 3 of the '263 Patent that has a hardness greater than 4 D80? 5 MR. RENISON: Objection, calls for a legal 6 conclusion. 7 A. I mean, I'm not the one who wrote the 8 patent, but the claim to me is clear, an elastomeric 9 layer of a material having a hardness from A60 to 10 D85. I mean, I'm not the one who wrote the patent 11 and I have not done an analysis where the range ends 12 other than I can read the words there. So it's a 13 range A60 to D85 and in Claim 1 of the '630 it's a 14 slightly different range, A80 to D75. They're two 15 different patents. 16 Q. Okay. 17 A. But they both pertain -- when they talk 18 about hardness, they both pertain to an elastomeric 19 material. 20 Q. Okay. So if I have an elastomeric 21 material -- wait. I'm sorry. I'm confused. I 22 can't -- if I have a material that is a hardness 23 between A60 and D85, right, like Trogamid at D81, 24 right -- better yet, let me do it this way. 25 Trogamid has a hardness of D81, you see that, right?

Page 262 1 TIM ANDREAS OSSWALD, Ph.D. 2 a urethane rubber they look at the hardness. 3 Q. Okay. Let me see if I understand this. So 4 if I have an inner layer and a multipol- -- 5 multilayer polymer sheet that has a hardness that 6 falls within the range of A60 to D85, right? Do you 7 understand that? There's a hardness that falls 8 within A60 to D85. Okay? Do you understand? 9 A. So you have a multilayered sheet where an 10 inner layer is an elastomer. 11 Q. I'm saying it has a hardness between A60 to 12 D85, right? 13 A. But you left the word "elastomer" out. 14 Q. I'll get to that. So if you can just 15 understand I have a multilayer sheet, right, I have 16 an inner layer that has a hardness that falls 17 between A60 to D85. Do you understand that? 18 A. Correct. 19 Q. Okay. Now, that may or may not satisfy the 20 soft inner layer B or B prime of claim 11 of the 21 '263 Patent, right? 22 MR. RENISON: Objection, calls for a legal 23 conclusion. 24 A. Claim 11 of the '263 Patent simply says 25 where the inner layer -- the soft inner layer B and	Page 263 1 TIM ANDREAS OSSWALD, Ph.D. 2 B prime individually comprise an elastomeric 3 material having a hardness. So it has to be an 4 elastomer with that range of hardness. 5 Q. Okay. That range of hardness defines 6 whether it is or is not an elastomer; is that what 7 you're saying? 8 MR. RENISON: Objection to the extent it 9 mischaracterizes prior testimony. 10 A. That's not what I said. I said an 11 elastomer that has that hardness. 12 Q. I see. And so what I'm coming back to you 13 is if I have a material that's in the inner layer of 14 a multilayer sheet and it falls between A60 to D85 15 for the hardness. You understand that, right? 16 A. I do. 17 Q. Okay. That doesn't necessarily satisfy the 18 claim? 19 A. It will satisfy -- 20 MR. RENISON: Same objection. 21 THE WITNESS: I'm sorry. It would satisfy 22 the claim if it's an elastomeric material with that 23 range of hardness. 24 Q. Right. And if it's not an elastomeric 25 material, then it won't?
Page 264 1 TIM ANDREAS OSSWALD, Ph.D. 2 MR. RENISON: Same objections. 3 MR. PIVOVAR: That's your position? 4 MR. RENISON: Same objection. 5 A. The claim itself, right, says layers B and 6 B prime individually comprises an elastomeric 7 material having a hardness. If it's not an 8 elastomeric material, then it can't be layers B or 9 B prime. It is an elastomeric material having a 10 hardness from A60 to D85. It's clear. That's 11 what -- that's what I or a person of ordinary skill 12 in the art would read. They would find an 13 elastomeric material with that -- with -- that falls 14 within that range and they -- if they do, then they 15 are infringing on the patent. 16 Q. I guess I'm trying to figure out what the 17 material requirements are for an elastomeric 18 material as opposed to another polymer. Can you 19 give me a definition for what is an elastomeric 20 material? 21 MR. RENISON: Objection, form. 22 A. I did. A thermoplastic elastomer -- 23 thermoplastic elastomers are elastomeric materials. 24 They usually deform a little bit more, they're 25 typically more compliant, they can be harder. Some	Page 265 1 TIM ANDREAS OSSWALD, Ph.D. 2 of them -- some polyurethanes or urethanes are 3 pretty hard. And here the definition is an 4 elastomeric material. TPE would fall under that, 5 TPU would fall under that, TPO's. There are all 6 kinds of elastomeric -- thermoplastic elastomers. 7 And in addition silicons would fall under that, 8 rubber materials would fall under that. 9 So it has to be an elastomeric material and 10 it would fall within that hardness. That's as clear 11 in the claim -- I mean, that's how I read the words 12 in the claim. 13 MR. PIVOVAR: All right. Let's go off the 14 record quickly. 15 THE VIDEOGRAPHER: We are off the record at 16 5:13. 17 (A short break was had.) 18 THE VIDEOGRAPHER: We are back on the 19 record at 5:30. 20 BY MR. PIVOVAR: 21 Q. Dr. Osswald, can you please go to table 2 22 of the '630 Patent, please. 23 A. Yes. 24 Q. Okay. Now, these are actual materials that 25 can be used as the elastomeric material for layer B

Page 266 1 TIM ANDREAS OSSWALD, Ph.D. 2 in the claims, right? 3 MR. RENISON: Objection to the extent it 4 calls for a legal conclusion. 5 A. I have to see. Table 2 provides a listing 6 of exemplary materials for use in the B component. 7 Similar or related materials can be obtained from 8 the manufacturers or produced by known methods. 9 Q. All right. So in table 2, do you see 10 that? 11 A. I see it. 12 Q. Okay. There -- the highest hardness range, 13 right, for any of the polymers listed in table 2 is 14 D70, right? 15 MR. RENISON: Objection, form. 16 A. In the -- in table 2? 17 Q. Yep. Like the hardest material identified 18 in table 2 has a hardness of D70. 19 A. The next page, yeah. 20 MR. RENISON: Same objection. 21 Q. Right? 22 A. Sorry. Yep, I see a material from Evonik. 23 Q. All right. So the -- so my question is the 24 hardest material identified in table 2 has a 25 hardness of D70, right?	Page 267 1 TIM ANDREAS OSSWALD, Ph.D. 2 A. Yeah. They define a vestamide there which 3 has a range between D40 to D70. 4 Q. All right. 5 A. So that would be a softer or a harder 6 elastomer. 7 Q. With a maximum hardness of D70 according to 8 table 2, right? 9 A. Correct. 10 Q. Okay. Now, if you look at your declaration 11 at paragraph 49. 12 A. Paragraph 49. Sorry. 13 Q. Yeah. That's all right. 14 A. Yes. 15 Q. All right. Do you see the Shore hardness 16 scales there that are kind of graphically depicted 17 in that paragraph? 18 A. Yes. 19 Q. Okay. So do you see where it says Shore 20 D80 and it shows PVC pipe? 21 A. Yes. 22 Q. All right. Is PVC pipe an elastomer? 23 A. No. 24 Q. Okay. And do you see above that on the 25 very top it says "Extra hard," right?
Page 268 1 TIM ANDREAS OSSWALD, Ph.D. 2 A. Yes. 3 Q. Okay. So materials according to this chart 4 in paragraph 49 of your declaration show that 5 materials that have a Shore D of 60 and above are 6 extra hard according to figure 7; do you see that? 7 MR. RENISON: Object to form. 8 A. Sure. And the Shore hardness scales, at 9 least in this scale here from the Internet, that's 10 how they define it. I mean, that's -- those are 11 arbitrary notes, but yeah, that's -- that would be 12 an extra hard material. 13 Q. Right. And then between Shore, I don't 14 know, D30 to D60 it's identified as being a hard 15 material, right? 16 A. Correct, in this graph. 17 MR. PIVOVAR: All right. I think with that 18 I don't have any further questions for you, 19 Dr. Osswald. I'll pass the witness. 20 MR. RENISON: I have no questions for the 21 witness now. Reserve reading and signing. 22 MR. PIVOVAR: Thank you for your time 23 today, Dr. Osswald. 24 THE WITNESS: Thank you. Nice meeting you. 25 MR. PIVOVAR: As well.	Page 269 1 TIM ANDREAS OSSWALD, Ph.D. 2 THE WITNESS: Nice meeting another Badger. 3 THE VIDEOGRAPHER: We are off the record at 4 5:34. 5 (Whereupon, at 5:34 p.m. the 6 taking of the instant deposition 7 ceased.) 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

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TIM ANDREAS OSSWALD, Ph.D.

ACKNOWLEDGEMENT OF DEPONENT

I, TIM ANDREAS OSSWALD, Ph.D., being first duly sworn, on oath say that I am the deponent in the aforesaid deposition taken on the 18th day of February, 2022; that I have read the foregoing transcript of my deposition consisting of pages 1 through 271, inclusive, and affix my signature to same.

TIM ANDREAS OSSWALD, Ph.D.

DATE _____

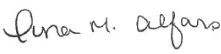
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TIM ANDREAS OSSWALD, Ph.D.

C E R T I F I C A T E

I, TINA M. ALFARO, Registered Professional Reporter, Certified Realtime Reporter, and Registered Merit Reporter, the officer before whom the foregoing deposition was taken, do hereby certify that the foregoing transcript is a true and correct record of the testimony given; that said testimony was taken by me stenographically and thereafter reduced to typewriting under my direction; that reading and signing was requested; and that I am neither counsel for, related to, nor employed by any of the parties to this case and have no interest, financial or otherwise, in its outcome.

IN WITNESS WHEREOF, I have hereunto set my hand on this 24th day of February, 2022.



Tina M. Alfaro, RPR, CRR, RMR

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ERRATA SHEET

Case Name:

Deposition Date:

Deponent:

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Signature of Deponent _____

SUBSCRIBED AND SWORN BEFORE ME

THIS ____ DAY OF _____, 2022.

(Notary Public) MY COMMISSION EXPIRES: _____